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Paper No. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex Parte STEVEN M. MAGGARD, JAMES H. HIGGINBOTHAM
and JOSEPH H. WALKER

Appeal No. 1996-1813
Application 08/117,453¹

ON BRIEF

Before, PAK, OWENS and JEFFREY T. SMITH, Administrative Patent Judges.

JEFFREY T. SMITH, Administrative Patent Judge.

Decision on appeal under 35 U.S.C. § 134

Applicants appeal a decision of the Primary Examiner rejecting claims 1-18, all the claims in the application. We have jurisdiction under 35 U.S.C. § 134.

¹ Application for patent filed September 7, 1993. According to applicants, the application is a continuation-in-part of Application 07/800,788, filed November 27, 1991 now abandoned. The real party in interest is the Ashland Oil Corporation.

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The examiner cited the following references in the
rejection
of the claims:

Harte et al. 1974 (Harte)	3,792,272	February 12,
Dawes	4,612,291	September 16, 1986
Inman, Jr. et al. (Inman)	4,733,965	March 29, 1988
Maggard 1990 (Maggard '745)	4,963,745	October 16,
Maggard (Maggard WO'762)	WO 91/15762	October 17, 1991
Maggard et al. (Maggard '785)	5,145,785	September 8, 1992

Howard Mark et al., Advances in near Infrared Analyzer Technology, Chemical Processing, February 1991, pp. 54-58.
(Mark)

The examiner entered the following rejections:

Claims 1-8 and 16-18 have been rejected as unpatentable under 35 U.S.C. § 103 over either Maggard WO'762 or Maggard '785 in combination with Inman.

Claims 9-15 have been rejected as unpatentable under 35 U.S.C. § 103 over either Maggard WO'762 or Maggard '785 in combination with Inman and Dawes.

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Claims 1-5, 7-8 and 16-18 have been rejected as unpatentable under 35 U.S.C. § 103 over the combination of Harte and Inman.

Claims 1-8 and 16-18 have been rejected as unpatentable under 35 U.S.C. § 103 over Maggard '745 in combination with Inman and Mark.

Claims 9-15 have been rejected as unpatentable under 35 U.S.C. § 103 over Maggard '745 in combination with Inman, Mark and Dawes.

The claimed invention

The claimed invention is drawn to a system for the determination of properties of liquid hydrocarbon mixtures by spectral absorption. The claimed invention also comprises a prototype injection means which injects protofuel in to the spectral sampling system. The protofuel, which comprises a plurality of standardized hydrocarbons, is use to calibrate the spectral system. (Specification page 6, lines 4-13). The use of at least two protofuels for system calibration allows for their sequential injection. This provides system calibration by measuring the property, e.g. octane, at multiple points. Figure 7, is said to exhibit the advantages of at least two point calibration over single point

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calibration for the octane property. (Specification page 9, lines 17-27).

Representative claims 1, 8, 9 and 11 are reproduced below:

1. A system for the determination of at least one property of liquid hydrocarbon mixtures by spectral absorption comprising in combination:
 - A. a multivariate spectrophotometer operably connected to measure said property;
 - B. at least two sources of reference liquid hydrocarbons having different known values of said property, said sources communicating with;
 - C. prototype injection means for automatically sequentially injecting a plurality of said reference liquid hydrocarbon mixtures into said multivariate spectrophotometer for calibration of said system over a range of said property.
8. A system according to claim 1 wherein the system is substantially enclosed in hermetic cabinets having cabinet purging means and said spectrophotometer comprises a near infrared spectrophotometer.
9. A system according to claim 1 additionally comprising in combination the following elements in fluid communication.
 - A. Sample supply means (20); upstream of the following which are connected in series
 - B. Sample filter means (70); and
 - C. Sample temperature controller means (96); and
 - D. Degassing means (110); all upstream of
 - E. Analysis probe holder means (130); connected upstream of
 - F. Sample return means (150).
11. In a system for the analysis of mixtures of hydrocarbons by near infrared absorption, the improvement comprising in combination providing the following elements in fluid communication:

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- A. sample supply means; upstream of
- B. sample temperature controller means; and
- C. degassing means; both upstream of
- D. analysis probe holder means containing a fiber optic probe adapted for post dispersive transfectance measurement and operably connected to an infrared spectrophotometer;
- E. prototype injection means for automatically periodically injecting one of at least two hydrocarbon mixtures of predetermined property into said system to provide a reference for calibration of said system over a range;
- F. a plurality of sources of said hydrocarbon mixtures of different predetermined property operably connected to feed said prototype injection means.

Rejections under 35 U.S.C. § 103

The Prior Art

The Maggard '785 patent

Maggard discloses a process for the determination of aromatic constituents in hydrocarbons by near infrared spectroscopy. (Column 1, lines 17-19). Aromatic and nonaromatic calibration standards are said to be derived from a hydrocarbon which has been subject to high performance liquid chromatography. (Column 2, lines 52-57). The concentration of aromatics in the sample is then determined by measuring the absorbance of each of the two portions at the frequency being used. (Column 2, lines 57-64). The absorbance reading are subsequently used to derive the

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calibration equation and its constants (Column 3, lines 26-30). After the system has been calibrated, the absorbance of unknown samples are taken to determine the concentration of aromatic and nonaromatic components. (Column 3, lines 31-35). The reference does not describe the automatic injecting of the calibration standards.

The Maggard PCT application WO '762

Maggard describes a process for the determination of PIANO aromatics (paraffins, aromatics, isoparaffins, naphthenes and olefins) and alpha olefins constituents in complex mixtures, such as gasoline, by near infrared spectroscopy. (Page 4, lines 5-9 and 21-24). Instrument calibration is said to be accomplished by performing analysis on known samples to determine the weighting constants or equivalents. For example, octane measurement is said to be obtained by determining absorbance for known samples at wavelengths within each of the specific bands for each of the PIANO components. (Page 7, lines 18 to page 8, line 12). The absorbance measured is subject to analysis for the determination of weighting constants. The process is subsequently repeated for unknown samples. (Page 8, line 13-16). Examples 1, 3 and 4 describe the use of calibration sets which comprise 50

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samples. (Page 11, lines 10-14, page 14, last paragraph, and page 15, last paragraph). The reference does not describe the automatic injecting of the calibration standards.

The Inman patent

Discloses the automated spectrophotometric analysis of multiple fluid samples by comparing the spectral characteristics of known standard fluid samples with unknown fluid samples. (Column 1, lines 16-21 and 56-64). Particularly, the Inman describes an automatic fluid injection device in combination with a spectrophotometer. (Column 2, lines 5-8). According to the reference, the system coordinates the sequence and entry of desired parameter values for controlling the operation of spectrophotometers. This includes the injecting, scanning and the data processing analysis of blank sample (unknown) solutions. (Column 2, lines 47-53). Column 4, lines 28-49, describes the use of standard fluids in the automated system.

The Harte patent

Harte discloses a system for detecting the quantitative amount of a carbon hydrogen compounds contained in gaseous mixtures. (Column 3, lines 58-61). The disclosed invention is an infrared analyzer which can be adapted to measure the

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presences of particular substances such as ketones and methane. (Column 4, lines 26-33). Harte discloses that the alcohol, ketone and aldehyde content of liquid samples can be determined however, the samples must be totally vaporized. (Column 12, lines 21-25). The reference does not describe an automated system for injecting samples or the use of multiple calibration standards.

The Maggard '745 patent

Discloses a device and process for the use of near infrared absorbance of the methylene band to measure octane by near infrared spectroscopy. (Column 1, lines 33-37). The reference does not describe an automated system for injecting samples or the use of multiple calibration standards.

The Dawes patent

The invention relates to a method and apparatus developed for use in automated chemistry analysis systems. (Column 3, lines 36-38). Dawes describes the degassing liquid samples prior to chemical analysis. (Column 2, lines 37-40). The reference does not describe the use of multiple calibration standards.

The Mark article

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Relied upon to teach that NIR analyzers require periodic calibration by the introduction and analysis of verification samples (paragraph bridging pages 57-58). The reference does not describe the use of multiple calibration standards.

Discussion

In presenting the appeal, applicants have separately addressed each rejection, but has not separately asserted the patentability of the claims within each group for each of the rejections. The claims stand or fall together for the rejections where the applicants have not separately argued their patentability. 37 CFR § 1.192(c)(5); In re Goodman, 11 F.3d 1046, 1053, 29 USPQ2d 2010, 2013 (Fed. Cir. 1993); In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernakar, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983); In re Kaslow, 707 F.2d 1366, 1376, 217 USPQ 1089, 1096 (Fed. Cir. 1983); In re Albrecht, 579 F.2d 92, 93-94, 198 USPQ 208, 209 (CCPA 1978). Where an applicant does not "point out what relevance the additional limitations have to the patentability of the narrower claims," the claims will stand or fall together even if applicants assert that the claims do not stand or fall together. In re Herbert, 461 F.2d 1390, 1391, 174 USPQ 259, 260 (CCPA 1972).

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The Federal Circuit has delineated the standard for establishing a prima facie case under § 103 based on a combination of references:

Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. See In re Dow Chemical Co., 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*

In re Vaeck, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Rejections over the Maggard '785 reference

Claims 1-18 have been rejected as unpatentable under 35 U.S.C. § 103 over combination of Maggard '785, Inman and Dawes. The examiner's position may be understood from the following excerpt from the Examiner's Answer:

Maggard et al ('785) disclose a system for near IR analysis of hydrocarbons which comprise a conventional near infrared spectrometer (see column 4, lines 55-60) and further teaches the introduction

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to the system of calibrant standards of known composition (see column 3, lines 20-35). Therefore, the presence in the analysis system of Maggard of a calibrant introduction means would have been inherent as required for the disclosed method of use or, in any event, obvious to one of ordinary skill in order to enable the desired introduction for analysis of calibration standards. It is noted that any such calibrant introduction means would have been fully capable of introducing a plurality of equilibration standards in succession as well as introducing a mixture of hydrocarbons.

Maggard ('785) is [are] silent as to the injection of calibration standards being automatic and periodic.

However it is well known and conventional to periodically calibrate measuring instruments in order to ensure accurate results over time (see Inman, Jr. et al. at column 2, lines 15-19 and 46-52). Therefore, it would have been obvious to one of ordinary skill in the art to perform the disclosed calibration periodically as needed.

Examiner's Answer, page 6, line 19 to page 7, line 16.

Applicants argue that the examiner has not established a prima facie case of obviousness.² Particularly, applicants argue that none of the cited references suggest the periodic and automatic sampling from two or more hydrocarbon blends of

² Applicants have failed to specifically point out the deficiency in the rejection of claims 1-8 and 16-18 under 35 U.S.C. § 103 over the Maggard '785 reference. It is noted that applicants reply brief asserts that the reference does not render obvious the present invention's plurality of reference samples sequentially injected to calibrate over a range. Further, applicants assert the addition of the Inman reference does not cure deficiency of Maggard '785. (Reply Brief, page 7, lines 1-11).

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different known composition, and the reporting of these calibration readings interspersed among the actual measurements taken by the analysis. (Brief page 18, lines 7-10).

When addressing the rejection of the claims over the Maggard '785 reference, applicants presented a separate argument for claim 8. Thus, we will separately address this claim. Claims 1-7 and 9-18, will stand or fall with the patentability of claim 1. 37 CFR § 1.192(c)(7).

Claims 1-18 have been rejected as unpatentable under 35 U.S.C. § 103 over combination of Maggard '785, Inman and Dawes. We affirm.

Maggard '785 discloses the use of spectral absorption to determine the aromatic content in liquid hydrocarbons mixtures. (Column 2, lines 34-50). Two reference samples, one aromatic and another non-aromatic, are used for calibration of the spectrophotometer. (Column 2, lines 54-64). Maggard '785 differs from claim 1 in that the system is not disclosed as automatic. Inman discloses an automatic fluid injection device is capable of coordinating the sequence and entry of desired parameter values for controlling the operation of spectrophotometers. (Column 2, lines 47-53).

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Spectrophotometric analysis of large number of samples is performed more efficiently by the use of the automated fluid injection device. (Column 1, lines 57-63). It would have been obvious to one of ordinary skill in the art who performs spectrophotometric analysis on a large number of samples to incorporate an automatic injection device in the process of Maggard '785 in order to obtain an efficient operation. The measurement for aromatic content performed in Maggard '785 on the two reference samples would provide calibration of the spectrophotometer "over a range" as required by claim 1.

Applicants argue that the vibrating element of Dawes, used to degas a stationary liquid which is open to the atmosphere, would be useless to replace the debubbler recited in claim 8. (Brief, paragraph bridging pages 18-19). First, we note claim 8 does not recite a "debubbler". To the extent that applicants assert that Dawes does not suggest the desirability of degassing a liquid prior to spectrophotometric analysis, we do not agree. Dawes discloses that the degassing of liquids is desirable prior to chemical analysis. (Column 2, lines 33-40). The appearance of bubbles in samples subjected to spectrophotometric analysis could effect the IR reading produced. Thus, one of ordinary skill in the art

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would be motivated to remove bubbles from samples prior to spectrophotometric analysis.

Applicants arguments regarding the rejection over the combination of Maggard '785, Mark and Dawes, appearing on page 19 of the brief, will not be addressed because this rejection has not been presented for our review.

Applicants filed a reply brief to address the addition of the Inman reference in the statement of the 35 U.S.C. § 103 rejections. Except for claim 8, applicants' brief did not previously address the separate patentability of claims 1-7 and 9-18 over the Maggard '785 reference. Thus, regarding the Maggard '785 rejections, we will only address arguments concerning the patentability of claims 1 and 8.

Applicants assert the Inman reference seeks to solve a different problem from the preferred on-line (real time) systems to which the present invention is most preferred. Further, none of the cited references suggest using a plurality of different samples sequentially injected to calibrate the instrument over the range. (Reply Brief, page 5). First claim 1 is not limited to the scope of applicants preferred embodiments. Second, Maggard '785 discloses the use of two reference samples to calibrate the spectrophotometer.

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The use of two reference standards for calibration of the spectrophotometer would meet the "calibrate over a range" limitation of claim 1. As stated above, one of ordinary skill in the art would have been motivated to add the automated injection device to the spectrophotometric analysis system of Maggard '785 in order to obtain a more efficient system.

Rejections over the Maggard WO'762 reference

Claims 1-18 have been rejected as unpatentable under 35 U.S.C. § 103 over combination of Maggard WO'762, Inman and Dawes. Applicants argue that the examiner has not established a prima facie case of obviousness. Applicants position may be understood from the following excerpt from the Brief and Reply Brief:

The final rejection does not cite any patent which shows any automatic calibration of any instrument, much less the inventors' automatic calibration with several fuels to cover a range of values for the property, e.g. octane, being measured. Automatic none of the cited references suggest the periodic and automatic sampling from one or more hydrocarbon blends of different known composition, and the reporting of these calibration readings interspersed among the actual measurements taken by the analysis. (Brief page 18, lines 7-10).

(Brief, page 16, line 4-7).

When addressing the rejection of the claims 1-8 and 16-18 over the Maggard WO'762 reference, applicants have not

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presented separate arguments for claims 2-8 and 16-18. Thus, claims 2-8 and 16-18, all of which depend from claim 1, will stand or fall with the patentability of claim 1.

37 CFR § 1.192(c)(7).

We affirm the rejection of claims 1-8 and 16-18 for reasons presented below.

Maggard WO'762 describes a process for the determination of PIANO aromatics (paraffins, aromatics, isoparaffins, naphthenes and olefins) and alpha olefins constituents in complex mixtures, such as gasoline, by near infrared spectroscopy. (Page 4, lines 5-9 and 21-24). Instrument calibration is said to be accomplished by performing analysis on known samples to determine the weighting constants or equivalents. For example, octane measurement is said to be obtained by determining absorbance for known samples at wavelengths within each of the specific bands for each of the PIANO components. (Page 7, lines 18 to page 8, line 12). The absorbance measured is subject to analysis for the determination of weighting constants. The process is subsequently repeated for unknown samples. (Page 8, line 13-16). Examples 1, 3 and 4 describe the use of calibration sets which comprise 50 samples. (Page 11, lines 10-14, page 14,

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last paragraph, and page 15, last paragraph). Maggard WO'762 does not describe the automatic injecting of the calibration standards. Inman discloses an automatic fluid injection device is capable of coordinating the sequence and entry of desired parameter values for controlling the operation of spectrophotometers. (Column 2, lines 47-53). Spectrophotometric analysis of large number of samples is performed more efficiently by the use of the automated fluid injection device. (Column 1, lines 57-63). It would have been obvious to one of ordinary skill in the art who performs spectrophotometric analysis on a large number of samples to incorporate an automatic injection device in the process of Maggard WO'762 in order to obtain an efficient operation. The measurement for PIANO content performed in Maggard WO'762 on the multiple reference samples, shown in the examples, would provide calibration of the spectrophotometer "over a range" as required by claim 1.

Applicants also argue the combination of features contained in claims 9, 10 and 11 provide a less obvious combination. (Brief, page 16, line 15 to page 17, line 7).

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Claims 9-15 were rejected under 35 U.S.C. § 103 over the combination of Maggard WO'762, Inman and Dawes references. We reverse.

Claim 9 requires a sample supply means upstream from a sample filter means, sample temperature controller means and degassing means all upstream from the analysis probe holder means and sample return means. Claim 11 requires a sample supply means upstream from a sample temperature controller means and degassing means both upstream from the analysis probe holder means and the prototype injection means. The examiner states it is notoriously well known in the art to precondition liquid samples prior to analysis in order to remove any potentially interfering substances such as solids or entrained gas bubbles. Therefore, it would have been obvious to one of ordinary skill in the art to provide conventional devices known for accomplishing such sample conditioning. (Examiner's answer, page 9). We agree with the examiner that preconditioning of samples prior to analysis is desirable however, this does not address the organization and combination of components required by claims 9 and 11. The preconditioning of samples does not necessarily require the specific combination of components contained in claims 9 and

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11. The examiner has not directed us to evidence which would render the subject matter of claims 9 and 11 prima facie obvious.

Rejections over the Maggard '745 reference

Claims 1-8 and 16-18 have been rejected as unpatentable under 35 U.S.C. § 103 over Maggard '745 in combination with Inman and Mark. Claims 9-15 have been rejected as unpatentable under 35 U.S.C. § 103 over Maggard '745 in combination with Inman, Mark and Dawes. For the reasons stated below we reverse.

Maggard '745 discloses a device and process for the use of near infrared absorbance of the methylene band to measure octane by near infrared spectroscopy. (Column 1, lines 33-37). The reference differs from claims 1 and 11 in that it does not describe the use of multiple calibration standards or an automated system for injecting samples. To overcome the deficiencies of Maggard '745, the examiner relies on the Mark and Inman references. Mark teaches NIR analyzers require periodic calibration by the introduction and analysis of verification samples (paragraph bridging pages 57-58). However, Mark does not describe the use of multiple calibration standards. Inman describes an automatic fluid

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injection device in combination with a spectrophotometer. The system is said to be capable of coordinating the sequence and entry of desired parameter values for controlling the operation of spectrophotometers. (Column 2, lines 47-53).

Inman describes the use of standard fluids in the automated system however, there is no express disclosure of the use of multiple calibration standard solutions. (See column 4, lines 28-49). The examiner has not directed us to motivation for adapting the invention of Maggard '745 to incorporate multiple standard samples for calibration of the spectrophotometer. The addition of the teachings of the Inman and Mark references does not remedy the deficiencies of the Maggard '745 reference.

Rejections over the Harte reference

Claims 1-5, 7-8 and 16-18 have been rejected as unpatentable under 35 U.S.C. § 103 over the combination of Harte and Inman. For the reasons stated below we reverse.

The examiner asserts that Harte discloses the use of multiple liquid calibration standards. The examiner's position can be understood from the following excerpt from the Examiner's Answer:

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Harte et al. teach the injection of a plurality of breath alcohol calibration standards having different concentrations wherein the calibration standards are generated from liquid solutions (see column 12, lines 8-17). It would have been obvious to one of ordinary skill in the art to analogously provide a plurality of liquid hydrocarbon calibration standards in order to enable the same calibration capability with respect to the disclosed measurement of hydrocarbons (Column 12, lines 31-34).

Examiner's Answer, paragraph bridging pages 4 and 5.

We do not agree with the examiner's position. First, the portion of Harte relied upon by the examiner refers to determining if the Lambert-Beer Law applies to alcohol vapors over the range of 0.005% to 0.5%. (Harte, column 12, lines 12-14). This disclosure does not suggest that calibration of the spectrophotometer requires the use of at least two liquid hydrocarbon reference standards. Second, the Harte invention involves the analysis of gaseous vapors. (See Harte, column 12 lines 29-35). The present invention is directed to the on stream analysis of liquid formulations, e.g. gasoline, where the liquid formulation is tested to determine various properties such as the octane content. According to the applicants, the advantages of multiple point calibration allows for certainty that the spectrophotometer is correctly calibrated. (Appeal Brief, page 3, lines 6-17). The examiner

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has not directed us to motivation for adapting the gaseous analysis system of Harte to incorporate multiple liquid standard samples for calibration of the spectrophotometer. The addition of the teachings of the Inman and Mark references does not remedy the deficiencies of the Harte reference.

Summary

The rejection of claims 1-18 under 35 U.S.C. § 103 over the combination of Maggard '785 Inman and Dawes. We affirm.

The rejection of claims 1-8 and 16-18 under 35 U.S.C. § 103 over the combination of Maggard WO'762 and Inman. We affirm.

The rejection of claims 9-15 under 35 U.S.C. § 103 over the combination of Maggard WO'762 and Inman and Dawes. We reverse.

The rejection of claims 1-5, 7-8 and 16-18 under 35 U.S.C. § 103 over the combination of Harte and Inman. We reverse.

The rejection of claims 1-8 and 16-18 under 35 U.S.C. § 103 over the combination of Maggard '745, Inman and Mark. We reverse.

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The rejection of claims 9-15 have been rejected as unpatentable under 35 U.S.C. § 103 over the combination of Maggard '745 Inman, Mark and Dawes. We reverse.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

CHUNG K. PAK
Administrative Patent Judge

TERRY J. OWENS
Administrative Patent Judge

JEFFREY T. SMITH
Administrative Patent Judge

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